



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

09/905,157

07/12/2001

Nathan S. Lewis

CIT1270-1

2732

41790

7590

11/15/2005

BUCHANAN INGERSOLL LLP
(INCLUDING BURNS, DOANE, SWECKER & MATHIS)
12230 EL CAMINO REAL
SUITE 300
SAN DIEGO, CA 92130

EXAMINER

DOTY, HEATHER ANNE

ART UNIT

PAPER NUMBER

2813

DATE MAILED: 11/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/905,157

Applicant(s)

LEWIS ET AL.

Examiner

Heather A. Doty

Art Unit

2813



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 September 2005.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4-8,13,16-27,31-41 and 44-53 is/are pending in the application.
4a) Of the above claim(s) 6-8,18-20 and 31-40 is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) _____ is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 12 July 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date: _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date: _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 4, 5, and 44-48 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter that was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Paragraph 0033 of the instant specification appears to disclose an organic layer immediately adjacent to a region of porous silicon, not "immediately adjacent to the region of monocrystalline silicon-containing material," as recited in claim 1. Claims 4, 5, and 44-48 are rejected under 35 U.S.C. 112, first paragraph, for depending from rejected claim 1.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 4, 5, and 44-48 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation "an organic layer immediately adjacent to the region of monocrystalline silicon-containing material having more than half of its atoms being

Art Unit: 2813

carbon and hydrogen, wherein the organic layer is chemically bonded to the surface of the silicon-containing material....” It is not clear which silicon-containing material the organic layer is bonded to, since the claim recites a region of monocrystalline silicon-containing material and a region of porous silicon, both of which are silicon-containing materials. The specification appears to disclose organic layers bonded to crystalline silicon and not to porous silicon, and further discloses organic layers bonded to crystalline silicon adjacent to regions of porous silicon, but does not disclose organic layers “immediately adjacent to the region of monocrystalline silicon-containing material” (see 35 U.S.C. 112 first paragraph rejection above). It is therefore not clear how the organic layer could be bonded both to the surface of the monocrystalline silicon-containing material and immediately adjacent to the region of monocrystalline silicon-containing material. For the purposes of patentability, the Examiner will interpret the claim to read that the organic layer is immediately adjacent to the *region of porous silicon*, consistent with paragraph 0033 of the instant specification, the only paragraph that appears relevant to the combination of porous and monocrystalline silicon in a single substrate. Claims 4, 5, and 44-48 are rejected under 35 U.S.C. 112, second paragraph, for depending from rejected claim 1.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless – (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 13, 16, 17, 21, 25-27, 41, and 49-53 are rejected under 35 U.S.C. 102(b) as being anticipated by Linford et al. (U.S. 5,429,708).

Regarding claims 13 and 16, Linford discloses a semiconductor substrate comprising providing an, *inter alia*, monocrystalline or porous silicon-containing material **12** (col. 1, lines 17-21) having a surface **40** substantially free of oxidation (as shown in Figs. 2A, 2B, 3, etc.; and as stated at col. 2, lines 6-45); and forming an organic monolayer—further limited by claim 16—**44, 45, 46** having more than half of its atoms being carbon and hydrogen (because R is, *inter alia*, alkyl, alkenyl, aryl, cycloalkyl...." (col. 5, lines 5-13) which are 100% carbon and hydrogen), wherein the organic layer is chemically bonded to the surface **10, 30, 32, 38** of the silicon-containing material **12** (col. 2, lines 6-45), and wherein an electrical property of the electrical structure is altered and/or improved compared to a same substrate without the organic layer, as indicated by Linford (col. 1, lines 21-31; paragraph bridging cols. 8-9; all figures).

For example, Linford states in the paragraph bridging cols. 8-9,

"For example, such molecular layers are suitable for use with: silicon based, micromechanical devices to minimize stiction; **electrode surfaces to optimize their electrochemical properties** for use in **fuel cells** or **electrochemical synthetic cells**; **solar cells as an antioxidation coating**, silicon chips as a monomolecular photoresist, and Si-based chemical sensors to **alter the electrical properties** of the underlying Si." (Emphasis added.)

The word "optimization," by definition, is to improve, and the word "alter" is a synonym of the word "change." Accordingly, Linford expressly and inherently teaches both changing and improving the electrical properties of the semiconductor substrate.

It is seen to be inherent that the organic layer of Linford changes the electrical property of the silicon-containing material, wherein the electrical properties are selected from a group consisting of surface recombination velocity, carrier lifetime, electronic efficiency, voltage, contact resistance, and resistance of a doped region, in addition to those regarding the carrier lifetime—further limited by claims 49-53. Evidence is the admission of Applicant in the instant specification (for example at p. 7, paragraph 0031 and paragraph 0056, bridging pp. 15-16).

See *In re Swinhart*, 169 USPQ 226,229 (CCPA 1971) (where the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an inherent characteristic of the prior art, it possesses the authority to require the applicant to prove that subject matter shown to be in the prior art does not possess the characteristics relied on) and *In re Fitzgerald*, 205 USPQ 594 (CCPA 1980) (the burden of proof can be shifted to the applicant to show that subject matter of the prior art does not possess the characteristic relied on whether the rejection is based on inherency under 35 U.S.C. 102 or obviousness under 35 U.S.C. 103).

Note that as long as there is evidence of record establishing inherency, failure of those skilled in the art to contemporaneously recognize an inherent property, function or ingredient of a prior art reference does not preclude a finding of anticipation. *Atlas Powder Co. v. IRECO, Inc.*, 190 F.3d 1342, 1349, 51 USPQ2d 1943, 1948 (Fed. Cir. 1999). (Two prior art references disclosed blasting compositions containing water-in-oil emulsions with identical ingredients to those claimed, in overlapping ranges with the

claimed composition. The only element of the claims arguably not present in the prior art compositions was "sufficient aeration . . . entrapped to enhance sensitivity to a substantial degree." The Federal Circuit found that the emulsions described in both references would inevitably and inherently have "sufficient aeration" to sensitize the compound in the claimed ranges based on the evidence of record (including test data and expert testimony). This finding of inherency was not defeated by the fact that one of the references taught away from air entrapment or purposeful aeration.). See also *In re King*, 801 F.2d 1324, 1327, 231 USPQ 136, 139 (Fed. Cir. 1986); *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 782, 227 USPQ 773, 778 (Fed. Cir. 1985).

In the decision in *Toro Co. v. Deere & Co.*, 69 USPQ2d 1584 (CA FC 2004), at page 1590, last paragraph, it was held that if "one or more embodiments -- whatever the settings of their operational features -- [] necessarily include or result in the subject matter of [the] limitation," then inherent anticipation of the limitation exists.

Regarding claim 17, the organic layer is a polymer **46** (Fig. 12; col. 5, lines 37-45).

Regarding claim 21, the organic layer is formed by activating the surface of the silicon-containing material; and reacting the activated surface with a chemical, wherein during the reaction, a hydrocarbon group becomes chemically bonded to the silicon-containing material (col. 2, lines 6-45).

Regarding claim 25, the hydrocarbon is an allyl, called "alkenyl" and structurally described as " -C(R)=CH(R') " for example, in Linford (col. 5, lines 5-34).

Regarding claim 26, a polymer is formed by reaction with the surface-bound allyl group (col. 5, lines 37-46; paragraph bridging cols. 5 and 6).

Regarding claims 27 and 53, the hydrocarbon group is an alkoxide group (col. 4, lines 44-49; Fig. 5).

Regarding claim 41, Linford uses a hydrogen-terminated silicon surface prior to forming the organic layer (abstract; col. 1, lines 17-21).

Regarding claims 49-52, Linford teaches a methylated surface (col. 8, lines 9-15), an ethylated surface (alkyl with 2 carbons and 5 hydrogens), and a hexylated surface (alkyl with 6 carbons and 13 hydrogens—column 5, line 7).

Claims 13, 16, 21-24, 41, and 49-52 are rejected under 35 U.S.C. 102(b) as being anticipated by the article Bansal et al. (an instant inventor, Nathan S. Lewis being listed as a co-author) "Alkylation of Si surfaces using a two-step halogenation/Grignard route," Journal of the American Chemical Society, Vol. 118, 1996, pp. 7225-7226.

Regarding independent claim 13, Bansal discloses a process of forming a semiconductor substrate and the substrate produced thereby comprising, providing a hydrogen-terminated monocrystalline silicon substrate—as further limited by instant claim 41; activating the hydrogen-terminated silicon surface, substantially free of oxidation, by chlorinating the hydrogen-terminated surface—as further limited by instant claims 21 and 22; and reacting the activated silicon surface with an alkyl lithium or Grignard reagent to replace the chlorine atoms of the terminated sites with a monolayer of the alkyl group of the alkyl lithium or Grignard reagent, wherein the exemplary alkyl

groups have 1 (methyl), 2 (ethyl), 4 (butyl), 5 (pentyl), 6 (hexyl), 10 (decyl), 12 (dodecyl), or 18 (octadecyl) carbons—as further limited by instant claims 16, 23, 24, and 49-52.

While Bansal does not discuss the electrical properties (such as carrier lifetime) of the alkylated silicon substrate, it is held, absent evidence to the contrary, that the alkylated silicon substrate must have all of the same properties, electrical or otherwise, since the structure is the same as disclosed and claimed, and therefore reads on the properties as claimed in claims 13, and 49-52. (Compare the Bansal method to one of the methods of the instant specification, as recited in paragraphs 0046-0047 and 0066-0070, being claimed by Applicant to give the claimed electrical properties in the alkylated silicon substrate. Applicant's admissions in the instant specification provide additional evidence of inherency.)

In this regard, the following case law is believed relevant. In the decision in *Toro Co. v. Deere & Co.*, 69 USPQ2d 1584 (CA FC 2004), at page 1590, last paragraph, it was held that if “**one or more embodiments**—whatever the settings of their operational features— [] necessarily include or result in the subject matter of [the] limitation,” then inherent anticipation of the limitation exists. (Emphasis added.)

The claiming of a new use, new function, or unknown property that is inherently present in the prior art does not necessarily make the claim patentable. See *In re Best*, 562 F.2d 1252, 1254, 195 USPQ 430, 433 (CCPA 1977). Anticipation by a prior art reference **does not require the inventive concept of the claimed subject matter or the recognition of inherent properties that may be possessed by the prior art reference**. See *Verdegaal Bros. Inc. v. Union Oil Co.*, 814 F.2d 628, 633, 2 USPQ2d

1051, 1054 (Fed. Cir.), cert. denied, 484 U.S. 827 (1987). A prior art reference anticipates the subject matter of a claim when the reference discloses every feature of the claimed invention, either explicitly or inherently. See *Hazani v. Int'l Trade Comm'n*, 126 F.3d 1473, 1477, 44 USPQ2d 1358, 1351 (Fed. Cir. 1997) and *RCA Corp. v. Applied Digital Data Systems, Inc.*, 730 F.2d 1440, 14.44, 221 USPQ 385, 388 (Fed. Cir. 1984). **The law of anticipation does not require that the reference teach what the appellants are claiming**, but only that the claims on appeal "read on" something disclosed in the reference. See *Kalman v. Kimberly-Clark Corp.*, 713 F.2d 760, 772, 218 CSPQ 781, 789 (Fed. Cir. 1983), cert. denied, 465 U.S. 1026 (1984). Note that as long as there is evidence of record establishing inherency, failure of those skilled in the art to contemporaneously recognize an inherent property, function or ingredient of a prior art reference does not preclude a finding of anticipation. *Atlas Powder Co. vs. IRECO, Inc.*, 190 F.3d 1342, 1349, 51 USPQ2d 1943, 1948 (Fed. Cir. 1999). (Two prior art references disclosed blasting compositions containing water-in-oil emulsions with identical ingredients to those claimed, in overlapping ranges with the claimed composition. The only element of the claims arguably not present in the prior art compositions was "sufficient aeration...entrapped to enhance sensitivity to a substantial degree." The Federal Circuit found that the emulsions described in both references would inevitably and inherently have "sufficient aeration" to sensitize the compound in the claimed ranges based on the evidence of record (including test data and expert testimony). This finding of inherency was not defeated by the fact that one of the references taught away from air entrapment or purposeful aeration.). See also *In re*

King, 801 F.2d 1324, 1327, 231 USPQ 136, 139 (Fed. Cir. 1986); *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 782, 227 USPQ 773, 778 (Fed. Cir. 1985).

See *In re Swinhart*, 169 USPQ 226,229 (CCPA 1971) (where the Patent Office has reason to believe that a functional limitation asserted to be critical for establishing novelty in the claimed subject matter may, in fact, be an inherent characteristic of the prior art, it possesses the authority to require the applicant to prove that subject matter shown to be in the prior art does not possess the characteristics relied on) and *In re Fitzgerald*, 205 USPQ 594 (CCPA 1980) (the burden of proof can be shifted to the applicant to show that subject matter of the prior art does not possess the characteristic relied on whether the rejection is based on inherency under 35 U.S.C. 102 or obviousness under 35 U.S.C. 103).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 4, 5, and 44-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bruce et al. (U.S. 6,312,581) in view of Linford et al. (U.S. 5,429,708) and Wolf et al. (Silicon Processing for the VLSI Era, Vol. 1—Process Technology, Lattice Press: Sunset Beach, CA, 1986, pg. 5).

Regarding claim 1, Bruce et al. teaches a semiconductor substrate comprising a region of silicon-containing material (15 in Fig. 2B) having a surface substantially free of

oxidation (column 4, lines 55-58 discloses that this non-porous region is substantially free of oxidation, even after an oxidation process, so it was clearly substantially free of oxidation prior to the oxidation process); a region of porous silicon (12 in Fig. 2B); and an organic layer immediately adjacent to the region of porous silicon (photoresist mask 20 in Fig. 2B; column 4, lines 14-42), bonded to the surface of the silicon-containing material.

Bruce et al. does not specify that the silicon-containing material is monocrystalline. Bruce et al. also does not specify that the organic layer has more than half of its atoms being carbon and hydrogen, or that an electrical property selected from the claimed list is improved as compared to the electrical property of the substrate in the absence of the organic layer.

Wolf teaches that it is notoriously well known to fabricate silicon semiconductor devices on single crystal silicon because polycrystalline silicon "would exhibit inadequately short minority carrier lifetimes, due to defects occurring at the grain boundaries of the polycrystalline grains." Accordingly, it would have been obvious for one of ordinary skill in the art, at the time of the invention to use monocrystalline silicon wafers in Bruce et al. to ensure sufficiently high minority carrier lifetimes to enable workable semiconductor devices, as taught in Wolf.

Linford discloses a semiconductor substrate comprising providing an, *inter alia*, monocrystalline or porous silicon-containing material 12 (col. 1, lines 17-21) having a surface 40 substantially free of oxidation (as shown in Figs. 2A, 2B, 3, etc.; and as stated at col. 2, lines 6-45); and forming an organic monolayer 44, 45, 46 having more

Art Unit: 2813

than half of its atoms being carbon and hydrogen (because R is, *inter alia*, alkyl, alkenyl, aryl, cycloalkyl...." (col. 5, lines 5-13) which are 100% carbon and hydrogen), wherein the organic layer is chemically bonded to the surface **10, 30, 32, 38** of the silicon-containing material **12** (col. 2, lines 6-45), and wherein an electrical property of the electrical structure is altered and/or improved compared to a same substrate without the organic layer, as indicated by Linford (col. 1, lines 21-31; paragraph bridging cols. 8-9; all figures). *Linford additionally teaches that this organic monolayer is suitable for use with silicon chips as a monomolecular photoresist* (sentence bridging columns 8-9).

Therefore, at the time of the invention, it would have been obvious to one of ordinary skill in the art to use the organic monolayer taught by Linford as the photoresist on the substrate taught by Bruce et al. It is seen to be inherent that the organic layer of Linford changes the electrical property of the silicon-containing material beneath the organic layer in the resulting structure, wherein the electrical properties are selected from a group consisting of surface recombination velocity, carrier lifetime, electronic efficiency, voltage, contact resistance, and resistance of a doped region, in addition to those regarding the carrier lifetime—further limited by claims 44 and 48. Evidence is the admission of Applicant in the instant specification (for example at p. 7, paragraph 0031 and paragraph 0056, bridging pp. 15-16).

The motivation for doing so at the time of the invention would have been that the organic layer taught by Linford provides a substantial chemical and mechanical barrier, as expressly taught by Linford (column 8, lines 56-63).

Regarding claims 4 and 5, Linford teaches that the organic layer comprises a hydrocarbon (Table 1) and a polymer (Linford claim 32).

Regarding claims 44-47, Linford teaches a methylated surface (col. 8, lines 9-15), an ethylated surface (alkyl with 2 carbons and 5 hydrogens), and a hexylated surface (alkyl with 6 carbons and 13 hydrogens—column 5, line 7).

Regarding claim 48, Linford teaches an alkoxyated surface (col. 4, lines 44-49; Fig. 5).

Response to Arguments

In the amendment dated 02 September 2005, Applicant argues that as amended, claims 1, 4, 5, 13, 16, 17, 21-27, 41, and 44-53 are not anticipated either by Linford or Bansal (pp. 15-16). However, this argument is not persuasive since claim 1, and therefore its dependent claims 4, 5, and 44-48, are the only claims whose content was amended, essentially to incorporate material from canceled claim 12. As no additional arguments were presented regarding the previous Examiner's rejections under 35 U.S.C. 102(b) of claims 13, 16, 17, 21-27, 41, and 49-53, the rejections stand and are therefore repeated in this Office action.

Applicant's arguments regarding the rejection of claims 13 and 21-24 under 35 U.S.C. 103(a) over Tsukune in view of Wolf are persuasive, and the rejection is withdrawn (see p. 15).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Heather A. Doty, whose telephone number is 571-272-8429. The examiner can normally be reached on M-F, 8:30 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr., can be reached at 571-272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2813

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

had


CARL WHITEHEAD, JR.
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800